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C-A OPERATIONS PROCEDURES MANUAL

15.5.33 Porcelain Enamel Part Coating Procedure

(Vacuum Group Procedure VA-008.18.1.33)

Note: This document was formerly a C-A Group Procedure. The content of the group procedure was reviewed by the Technical Supervisor. All approvals and/or issue dates of the original group procedure are maintained for present use.

Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
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Approved: _____ *Signature on File* _____
Collider-Accelerator Department Chairman Date

M. Mapes

Vacuum Group Procedure VA-008.18.1.33
Original Issue Date: 12/15/05
Revision A

1. PURPOSE:

- 1.1 To provide a step by step procedure for the application of porcelain enameling steel and stainless steel parts and to ensure safety precautions are taken due to the potential exposure to silica.

2. RESPONSIBILITIES:

- 2.1 The vacuum Group Technical Supervisor and/or the cognizant engineer shall be responsible for implementing this procedure and ensuring that proper work planning for each job is done.

3. DISCUSSION:

- 3.1 This procedure is written to provide general guidelines and a step by step process for applying porcelain enamel to steel or stainless steel parts. Silica is one of the ingredients in the premill used to enamel parts. The technicians and cognizant engineers should be aware that silica is hazardous if inhaled. Precautions shall be taken to ensure that all silica dust and overspray is contained by the exhaust hood containment box and that proper PPE's are worn to ensure the safety of the technician performing the coating. Therefore all mixing and spraying of porcelain will take place inside the containment box under the exhaust hood.

4. PRECAUTIONS:

- 4.1 The work area under the exhaust hood shall be a cardboard containment box which is sealed with duct tape to the filter bank of the hood. The box shall also have an additional set of glass filters secured against the filter bank with duct tape.
- 4.2 The air velocity at the face of the containment box should be measured to ensure minimum air velocity has been reached. This will ensure that silica dust will be contained in the filters.
- 4.3 Technicians should keep all equipment clean before starting this procedure. The equipment shall be wiped down with a damp cloth before being removed from the containment box to ensure silica is spread in areas other than where the coating is being done.
- 4.4 Proper PPE's shall be worn during the spraying process.
- 4.5 The containment box shall be carefully pulled away from the filter bank and placed in a large plastic bag while being broken down. Any wipes used to clean equipment shall be discarded in plastic bags and discarded in trash receptacles to prevent any silica dust spreading to clean areas.
- 4.6 Spill Response - A small spill can be moistened with water from a spray bottle or damp cloth. In the event of a large spill, leave area and contact ESHQ Coordinator.

5. PREREQUISITES:

- 5.1 THE TECHNICIAN WILL HAVE BEEN TRAINED IN THIS PROCEDURE.
- 5.2 EWP completed and job walk-through completed before starting job
- 5.3 PPE's are required for this job. See EWP.
- 5.4 Technician performing procedure shall review the Hazards of Silica with ESHQ.

6. OPERATIONAL PROCEDURE:

- 6.1 Move all equipment to containment box
- 6.2 Put on all required PPE's
- 6.3 Ensure the frit container is inside the containment box before opening.
- 6.4 A mixing ratio of 500 grams of premill to 230 grams of water shall be used. Larger or smaller quantities can be mixed provided that this ratio is maintained. Place the desired premill in the blender canister and weigh the premill. Close premill container when desired premill is removed from container. Add the required water to make up the required mixing ratio.
- 6.5 Blend the water and premill together until thoroughly mixed.
- 6.6 Pour the mixture into the spray gun canister.
- 6.7 Wipe down all equipment with a damp cloth to ensure all silica residue is removed. Remove all equipment that will not be used for the balance of this procedure from the containment box after wiping down.
- 6.8 Arrange parts to be coated in containment box so they are accessible with spray gun. Fixtures may be necessary to hold parts
- 6.9 Spray the desired number of coats on the parts. Three coats sprayed at 15 minutes apart will produce a fired coating thickness of approximately 8 mils.
- 6.10 After the parts are sprayed. Remove them from the containment box and place them in the hot box at 100°C for a minimum of 1 hour to dry.
- 6.11 Start the air furnace and set the temperature to 850°C.
- 6.12 While the parts are drying clean the spray gun by wiping the outside down. Then remove the canister and remove the excess mixture from the canister with a cloth into a plastic bag. Rinse the spray gun with water to clean any residue from the canister and wipe with a cloth. Discard the cloth in the bag with the excess mixture. While the exhaust hood is still on slit the tape holding the filters to the box and carefully discard the filters into a plastic bag. Carefully pull the containment box away from the filter bank. Move the box enough to get access to the taped seams on the outside of the box. Slit the seams with a razor place the box in a large plastic bag. Close the bag and discard in trash. After all equipment is cleaned and the containment box is discarded, PPE's can be carefully removed and placed in a plastic bag and discarded. The PPE's should be removed as if the work was performed in a contamination area to ensure that silica dust on the PPE's is not spread or inhaled.
- 6.13 After the parts are dry and the furnace temperature is stable the parts can be fired. Firing time can be can vary due to the geometry and mass of the part. However, observing the part at short intervals during the firing is the best indicator for the firing time required. Wetting of the part can be observed and the firing time beyond this point should only be a few minutes. Trial and error is usually required to determine the best firing time due to the fact that the parts vary widely in mass and geometry.
- 6.14 After the part is fired for the desired time, the power to the furnace heater should be shut off and the lower bed of the furnace lowered for the cooling of the parts. The parts can cool to room temperature in this position.